

Patent claims

1. An ultrasonic standing-wave atomizer arrangement
5 (10) for producing a paint spray mist for painting
a workpiece, with a sonotrode (1), with a component
(2) arranged lying opposite the sonotrode (16, 28,
38), a standing ultrasonic field being formed in
the intermediate space between the sonotrode (1)
and the component (2) in the case of operation, and
10 with at least one paint feeding device, which
introduces the paint into the intermediate space
for the atomizing process at at least one paint
discharge point, characterized in that there is an
air supply device, which interacts with at least
15 one air distribution device, in that the air
distribution device has a number of clearances,
which serve for blowing out air, in that the
clearances are arranged in such a way that between
the at least one paint discharge point and the
sonotrode and also between the at least one paint
20 discharge point and the component there is formed
at least one region with a blocking air flow, by
which air flow wetting of the sonotrode or of the
component with paint is substantially avoided.
- 25 2. The ultrasonic standing-wave atomizer arrangement
as claimed in claim 1, characterized in that the at
least one air distribution device is a box-shaped
hollow body or a corresponding piece of pipe.
- 30 3. The ultrasonic standing-wave atomizer arrangement
as claimed in claim 1 or 2, characterized in that
there are two air distribution devices, by which
two blocking air flows that are independent of one
35 another are formed.
4. The ultrasonic standing-wave atomizer arrangement
as claimed in one of the preceding claims,

characterized in that the clearance are configured as round nozzles.

5. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the clearance at an air distribution device are arranged in at least one row, in that the clearance in a row under consideration are arranged at the same distances from one another along an imaginary straight line, and in that a blocking air flow is formed by each row.
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15. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the at least one air distribution device is at such a distance from the at least one paint discharge point and from the sonotrode or from the component that the thickness of the air flow required to avoid wetting is obtained, and in that the thickness can be empirically determined.
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25. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the clearances at an air distribution device are arranged along at least two imaginary straight lines, in that the at least two lines are parallel to one another, and in that, seen in the transverse direction in relation to the imaginary lines, the clearances of one of the imaginary lines are arranged offset in relation to the clearances of at least one of the other imaginary lines.
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35. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the clearances at one air

5 distribution device are arranged along two imaginary straight lines, in that the at least two lines are parallel to one another, and in that the blocking air flows caused by the respective rows are directed slightly against one another, so that the overall thickness of the overall blocking air flow formed by the individual blocking air flow, in particular in the intermediate space, is comparatively small.

10 9. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that an air distribution device is displaceable and/or pivotable for the purpose of influencing the form of the paint spray cone of the atomized paint, in particular is pivotable about a pivot axis parallel to one of the straight line.

15 10. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that there is at least one directing-air distribution device, which interacts with the at least one air supply device, in that the directing-air distribution device has a number of passages, which serve for the directed blowing out of air and the blown-out air formed for influencing the form of the atomized paint at least one region with a directing air flow.

20 30 11. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the at least one directing-air distribution device is a box-shaped hollow body or a corresponding piece of pipe.

35 12. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims,

characterized in that the passages are configured as round nozzles.

13. The ultrasonic standing-wave atomizer arrangement
5 as claimed in one of the preceding claims,
 characterized in that the at least one region of
 the directing air flow is formed approximately in
 the form of a cuboid or in the form of a fan by
 corresponding arrangement of the passages.
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14. The ultrasonic standing-wave atomizer arrangement
15 as claimed in one of the preceding claims,
 characterized in that the passages of a directing-
 air distribution device are arranged along at least
 one imaginary straight lines, in that this
 imaginary line is parallel to the clearance of the
 air distribution device assigned to the directing-
 air distribution device likewise arranged along a
20 further imaginary line, and in that, seen in the
 transverse direction in relation to the imaginary
 lines, the passages are arranged offset in relation
 to the clearances.
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15. The ultrasonic standing-wave atomizer arrangement
30 as claimed in one of the preceding claims,
 characterized in that the regions of the directing
 air flows, optionally also in combination with the
 regions of blocking air flows, form a tunnel-like
 overall region of an air flow enclosing the
 atomized paint.
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16. The ultrasonic standing-wave atomizer arrangement
 as claimed in one of the preceding claims,
 characterized in that the at least one directing-
 air distribution device is displaceable and/or
 pivotable for the purpose of influencing the form
 of the paint spray cone, in particular is pivotable

about the longitudinal axis of the respective directing-air distribution device.

17. The ultrasonic standing-wave atomizer arrangement
5 as claimed in one of the preceding claims,
characterized in that the at least one air
distribution device and/or the at least one
directing-air distribution device are respectively
10 subdivided into at least two segmental elements, in
that each segmental element has at least one
clearance or a passage, and in that the outflow
direction of the air is separately settable for
each segmental element of an air distribution
device or a directing-air distribution device, in
15 particular by pivoting them.
18. The ultrasonic standing-wave atomizer arrangement
as claimed in one of the preceding claims,
characterized in that the at least one air
distribution device or the at least one directing-
air distribution device as a blocking element,
20 which blocking element blocks or releases at least
one clearance or a passage for influencing the
outflow of air.
- 25 19. The ultrasonic standing-wave atomizer arrangement
as claimed in claim 18, characterized in that the
blocking element is configured as a rotation block.
- 30 20. The ultrasonic standing-wave atomizer arrangement
as claimed in one of the preceding claims,
characterized in that the at least one directing-
air distribution device has a directing air
element, which is pivotably mounted in a holding
35 element, in that at least two different
arrangements of apertures are arranged on the
directing-air distributing element, in that each
arrangement of apertures is formed as a region with

a defined directing air flow and in that, depending on the pivoting position of the directing-air distributing element concerned, the outflow of air is released.

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21. The ultrasonic standing-wave atomizer arrangement as claimed in claim 20, characterized in that the holding element is pivotable about the pivot axis of the directing-air distributing element.

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22. The ultrasonic standing-wave atomizer arrangement as claimed in claim 20 or 21, characterized in that the holding element has a passage point, within which a released arrangement of apertures is movable for adjusting purposes.

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23. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that a first distributor element, which interacts with the air supply device, is provided, in that the first distributor element reaches around the sonotrode and/or the component and in that arranged on the distributor element are first passages, through which air can be blown out in a directed manner, and in that the directed air serves for forming an air cushion between the end face of the sonotrode or of the component that is facing the intermediate space and the at least one paint discharge point.

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24. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the component and/or the sonotrode interacts with the air supply device, in that second passages through which air flows out in a directed manner are arranged on the component and the sonotrode, respectively, and in that the air flow flowing out in a directed manner serves for

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the formation of an air cushion between the end face of the component that is facing the intermediate space and the at least one paint discharge point.

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25. The ultrasonic standing-wave atomizer arrangement as claimed in either of claims 23 and 24, characterized in that the first distributing elements are subdivided into segments, which are

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respectively supplied with air separately.

26. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that a second distributing element

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is arranged on the side of the intermediate space lying opposite the spraying direction of the atomized paint, in that the second distributing element serves for producing an air flow which completely encloses the atomized paint in the vicinity of the at least one paint discharge point and at least partly carries it along.

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27. The ultrasonic standing-wave atomizer arrangement as claimed in claim 26, characterized in that the profile of the air flow can be set by the arrangement and alignment of apertures on the side of the second distributing element facing the at least one paint discharge point.

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28. The ultrasonic standing-wave atomizer arrangement as claimed in claim 26 or 27, characterized in that the air flow has a twist about the longitudinal direction of the spraying direction, which twist stabilises the air stream concerned.

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29. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that the free ends of pieces of

5 pipe are arranged in the vicinity of the at least one paint discharge point, through which pieces of pipe air flows out in a directed manner, and in that the outflowing air to a great extent prevents a recombination of atomized paint from different sheets of paint.

- 10 30. The ultrasonic standing-wave atomizer arrangement as claimed in one of the preceding claims, characterized in that at least one device for air distribution are arranged in the paint spraying direction below the intermediate space, and in that the air distribution device spatially re-forms the spray cone of the atomized paint after the atomization phase in the intermediate space and if need be accelerates the paint particles.
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List of designations

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| 10 | standing wave arrangement |
| 12 | sonotrode |
| 14 | reflector |
| 16 | space (in between) |
| 18 | paint nozzle |
| 20 | sheet of paint |
| 22 | air distributor |
| 23 | air feed |
| 24 | air nozzle |
| 26 | air curtain |
| 28 | spray |
| | cone |